

GUN LAYING & POSITIONING SYSTEM

THE M67 GLPS

The Gun Laying & Positioning System (GLPS) is being fielded to all active and reserve Field Artillery Cannon Non-Paladin units. The purpose is to enhance the tactical ability of the firing battery or platoon during the occupation of the firing position. It provides accurate directional control while providing position/location data for gun laying applications in the firing battery or platoon.

GLPS is a tripod-mounted positioning and orienting device composed of four fully integrated components: a north-seeking gyroscope, a Class I eye-safe laser range finder (LRF), a digital electronic theodolite interfaced with a Precision Lightweight GPS Receiver (PLGR). Using an accurate azimuth provided by the gyroscope, distance measurement provided by the laser rangefinder, and position information provided by the PLGR, the electronic theodolite measures deflection, vertical angle and range. It then calculates the easting, northing and altitude to the howitzer or designated forward station. The theodolite is an accurate angle measurement device that is integrated with the system's central processing unit and contains the GLPS software package. This data, to include grid coordinates, is rapidly displayed to the operator in a matter of seconds. Although not currently required to do so, GLPS in the future will be capable of transferring the data digitally to the operations center using existing and future fire direction and communications systems. The Directorate of Combat Developments (DCD) is currently working on how to accommodate the data transfer.

The current fielding strategy is to issue GLPS to each firing element down to platoon level. Towed and Self Propelled 155mm units will receive two systems per firing battery and a battalion float for a total of seven systems per battalion. Towed 105mm units will receive one system per battery and a battalion float for a total of four systems per battalion.

GLPS is equipped with fully automated and integrated Built In Test (BIT) equipment and employs contractor logistic support for the lifecycle of the system. In the event GLPS fails to function properly, the operator is informed via the data display located on the theodolite. After performing BIT to verify the deficiency, GLPS is turned in to organizational maintenance and the float system is issued. The inoperative GLPS is forwarded to the manufacturer through direct support maintenance and is repaired and returned within 30 days.

The GLPS was bought under the Warfighter Rapid Acquisition Program and fielding began without the development of Tactics, Techniques and Procedures (TTPs). TTPs are now being written and staffed at the Field Artillery School. TTPs will be available on the Gunnery Department Home Page by May/June 00. Until then, there are some key factors involving GLPS tactical employment and emerging TTPs:

- 1) The tactical positioning of the system has the same considerations as the aiming circle, but electronic line of sight when using the PLGR for location data is a factor. The PLGR is the primary source of location data if survey is not available. The GLPS needs location data to start its orientation process.

2) The location data entered in the system has one software constraint: the data entered into the system must be within +/- 200 meter easting and a +/- 1000 meter northing to maintain the directional capabilities of +/- 0.2 mils. There are several methods of providing location data to the GLPS. The PLGR is the primary means along with two procedures for using known position data.

3) The PLGR has specific settings in the set-up menu screen when used with the GLPS. The location data is received in the Averaging Mode and must be a FOM1 reading for use in Artillery Positioning. Selected Datum must be the same as the operational or the map datum being used throughout the unit. The information shown in the box (SET-UP OF THE PLGR) details specific settings for the PLGR when interfaced with the GLPS. These are taught by the fielding team and will be included in the TTPs. *(Editors note insert box)*

4) There may be times when the PLGR is not available. This may occur when the PLGR is non-mission capable, when electronic line of sight between the PLGR and supporting satellites is not possible due to terrain masking, or when electronic interference (intentional or unintentional) prevents the receipt of satellite signals. The GLPS software provides two additional methods of inputting location data. They are the Back Polar Plot and Input Position method found on the Positioning Menu screen. Units will have to develop position data and have it available to the GLPS operator for accomplishment of the mission. Use of known visible points within 2500 meters of the battery/platoon area can be used. (The GLPS eye safe LRFs operational capabilities are from 30 to 2500 meters.) This known point data is either manually input or digitally extracted from the 9-stored reference point capability of the GLPS or the 999 waypoints that can be stored in the PLGR. The GLPS doesn't eliminate the need for external survey assets like the Positioning Azimuth Determining System (PADS) that can establish known points. The GLPS can either set-up over an Orienting Station (OS) or use that known point in the back polar plot sub menu.

5) Once location and directional control is established the GLPS operator can begin the orientation process of the gun line. While using the gun laying menu and selecting the lay by deflection sub menu, the GLPS operator is first allowed to input the Azimuth of Fire for the firing point. He then determines deflections to the nearest tenth of a mil using the digital theodolite. Additionally with the incorporation of the eye safe laser range finder and digital electronic angle-measuring instrument, the system determines range and measures Vertical Angle (VA). The system goes one step further and takes the range and VA along with its known location and direction to the gun and provides the grid coordinate of the howitzer. This information (lay deflection, VA, range to gun, and grid coordinate) can be stored in the gun coordinates sub menu of the gun laying screen. The system can store up to eight gun locations. During advance party operations, the Gunnery Sergeant can store initial data for the guns and pass initial deflections to the gun guides. The transmittal of the advance party report to the main body Fire Direction Center will decrease the ready to fire times for the unit. While the Gunnery Sergeant is waiting the arrival of the main body, the system can be used to assist him in the preparation of the unit's defense diagram. By using the lay by azimuth sub-menu of the gun laying menu he can determine an azimuth to all locations within the perimeter and grid coordinate for each location. These would include such positions as Observation Posts (Ops), Listening Posts (LPs), and crew served weapon positions. The system can be used to accurately

identify avenues of approach and dead spaces for indirect artillery fires against the enemy.

6) There may be times when the GLPS will not be in the position area (with the gunnery sergeant on advance party) and the unit will have to maintain directional control with a conventional aiming circle. The GLPS has the capability to place directional control on the ground using the lay by azimuth sub-menu of the gun-laying screen. The system has already established location during the occupation at the orienting station (OS). The GLPS operator can establish direction by using the GLPS to emplace an orienting line (OL). One method is to move the safety circle out to a 30-meter distance (min distance for laser range finder) from the GLPS and use it as the EOL. Any object can be used as the EOL as long as it is 30 to 2500 meters from the system.

7) A question frequently asked of the NETT and the Gunnery Department is “If we orient the battalion with GLPS can this be considered common survey especially if the PLGR is used for position data?” If the PLGR is receiving data as stated in this article, units can use the GLPS for artillery positioning and howitzer orientation. GLPS does not truly meet the definition of common survey despite its accuracy because there is no means of ensuring “common error” at every station within the unit. This is because each station is receiving its own location with its own unique error. The PLGR was originally intended to be an aid to navigation and is a hasty survey instrument. The GLPS/PLGR combination is a more accurate means of hasty survey than units previously possessed (especially direction). It is not as accurate as PADS or conventional survey for location. However, faced with no better alternatives, GLPS and PLGR provide location and direction of sufficient accuracy to engage targets. Can the unit mass effectively? Units should not expect to mass any better than if they used PLGR data combined with accurate directional control.

Final development of Tactics, Techniques and Procedures for the employment of the GLPS will be a joint effort between the Field Artillery School (Gunnery Department) and the users in the force.

Questions regarding GLPS may be directed to Gunnery Department, USAFAS, at DSN 639-5625/5523. Fielding information may be obtained from Ms. Marta Favati, TACOM Rock Island at DSN 793-5705/3462.

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SET-UP OF THE PLGR

FROM MAIN MENU SELECT: SET-UP

SET-UP MODE: AVERAGING

SV-TYPE: all-y

SET-UP UNITS SCREEN SELECT:

SET-UP UNITS

UTM/UPS METRIC

ELEV: meter MSL or DTM (#1)

ANG:MIL-U Grid

SET-UP MAGVAR SCREEN

TYPE:Calc mil-u

WMM 1995

SET-UP

ELHold: automatic

TIME: ZULU

ERR: FOM

SET-UP DTM: (Datum must match

Operation or Map datum being used

By the unit)

#1 Select MSL for elevation values referred to Mean Sea Level,
select DTM for elevation referred to map datum